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## **Appendix 7**

### **DETAILS OF COWLITZ FALLS ANADROMOUS FISH RESTORATION PLAN (condensed)**

The purpose of this program is to restore anadromous fish runs to the upper Cowlitz River, above the Cowlitz Falls Dam, as well as protection of wild, native, and naturally reproducing resident fish and hatchery populations. This restoration is in part the result of the September, 1991 Settlement Agreement between the Bonneville Power Administration (BPA) and the Friends of the Cowlitz (FOC). To facilitate the restoration effort, BPA hired GAIA Northwest, Inc. and formed a Technical Advisory Committee (TAC) to develop the Cowlitz Falls Project Fisheries Management Plan: Anadromous Fish Reintroduction Program. TAC participants in this process included Lewis County Public Utility District (LCPUD), Washington Department of Fish and Wildlife (WDFW), National Marine Fisheries Service (NMFS), United States Fish and Wildlife Service (USFWS), United States Forest Service (USFS), FOC, HARZA NW Consultants, Tacoma Public Utilities (TPU) and members of the public. The TAC formed subgroups to work on Fish Passage and the Fish Facility, Natural Production and Interaction, and Artificial Production. This plan was revised and distributed at a public meeting in April of 1994. At that meeting, WDFW distributed the Cowlitz Falls Fishery Management Plan, a companion document which identifies State goals, strategies and priorities for implementation of the program. Last year WDFW updated the previous State Management Plan in a document entitled "Cowlitz Falls Anadromous Reintroduction Program." With the adoption of the Wild Salmonid Policy (WSP) by WDFW and the potential listing by NMFS of steelhead, this management plan will continue to evolve. The TAC Fish Passage/Fish Facility subgroup has remained the only active advisory group.

#### ***Reintroduction Program***

The first restoration fish, 350,000 late winter steelhead were scatter planted throughout the upper Cowlitz and Cispus River Basins in September 1994, followed by similar efforts, including releases of spring chinook and coho, in 1995 and 1996. These efforts along with the State's updated "Cowlitz Falls Anadromous Reintroduction Program," support from the hatcheries for donor stocks, and the future direction envisioned in WDFW's Wild Salmonid Policy provide an opportunity to restore runs of anadromous fish to anadromous habitat that is not currently being used. This is a fundamental goal of the Northwest Power Planning Council's Fish and Wildlife Program.

A critical component of the anadromous restoration program and its evaluation involves collection of juvenile salmonids at the Cowlitz Falls Fish Collection Facility. This fish facility is designed around a trap and haul program for upstream and downstream transport of both adult

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and juvenile salmonids respectively. This system incorporates a state of the art surface collection system, transport flumes, raceways and handling facility. The surface collection system and the handling facility, completed in December 1996, allow biologists maximum flexibility to monitor and evaluate the reintroduction program and to evaluate the new surface collection system. The facility was turned over to BPA/LCPUD in January 1997. Fish guidance efficiency (FGE) for steelhead may approach 75%. The preliminary FGE estimates for coho were less than 50%. The first FGE estimates for spring chinook appear to be less than 50%. However, many modifications (i.e. dewatering weir modification, pre-anesthetic chambers) remain to be completed to provide a fully functional and efficient facility for collecting, holding, sampling, and transporting fish.

### ***Fundamental Project Questions***

The work plan objectives are designed to address questions concerning restoration of anadromous fish runs to the watershed above the Cowlitz Falls Project.

- What are critical periods to maximize catch of smolts and/or presmolts?
- What are the Fish Guidance/ Collection Efficiencies for each species at the Cowlitz Falls Project and can they be improved?
- What impact does the collection, transportation, acclimation and release of the smolts have on their survival?
- Can fish be collected effectively without the baffle panels in place?
- What impact does flood operation of the Cowlitz Falls dam have on anadromous, resident and hatchery populations in and above the reservoir?
- What are the life histories in the upper Cowlitz Basin of each species and how does this affect our ability to restore naturally producing populations?
- What are the impacts of the introduction and interaction of anadromous fish with resident populations?
- What are the current habitat conditions affecting fish populations throughout the Cowlitz River watershed?
- What are the impacts of planting mitigation trout with/on resident and anadromous fish populations?

For the next several years efforts to reintroduce spring chinook, coho, and steelhead will be based primarily on fry plants from the Cowlitz Salmon and Cowlitz Trout hatcheries. Fry availability depends on hatchery space and operations, egg take and survival, and fry health and quality. Available adults will continue to be released in the upper watershed to allow natural spawning. The recreational steelhead smolt program will also continue to evolve. New rearing or extended

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acclimation facilities in the upper watershed to meet the goals envisioned in the original plan are not envisioned. Tacoma Public Utilities (TPU) is currently funding the cost of fry production. The long term goal is to develop self-sustaining natural populations in the watershed above the Cowlitz Falls Project.

### **1997-8 Cowlitz Falls Project Work Plan and Budget**

The work plan consists of four main categories. Project supervision will provide policy oversight and continuity.

- Supervision
- Fish Passage - Guidance and Collection Efficiencies, Collection, Transport, Survival
- Natural Production/Interaction (Evaluation of Reintroduction Strategies)
- Artificial Production/Endangered Species Act Consultation/Oversight

The following sections discuss the objectives, work plan (tasks) and budget for WDFW staff for the Cowlitz Falls Project. The objectives were derived from the "Cowlitz Falls Project Fisheries Management Plan: Anadromous Fish Reintroduction Program" (Chapter 1, page 1-1, Chapter 2, pages 2-18 & 20, and Chapter 3, page 3-5), WDFW's "Cowlitz Falls Fish Management Plan" and from direction of the Cowlitz Falls Technical Advisory Committee.

### **SUPERVISION - POLICY OVERSIGHT**

#### *Approach*

Supervision for the Cowlitz Falls restoration project will include several biologists with expertise in anadromous fish, resident fish, smolt collection facilities at hydro projects, fish marking/handling, and hatcheries:

- Wolf Dammers, Anadromous Fish Biologist 4, project supervisor
  - Dan Rawding, Anadromous Fish Biologist 3, assistant project supervisor
  - John Weinheimer, Resident Fish Biologist 4, assistant project supervisor
- provide direction consistent with WDFW policies 2 months

One Fish Biologist 3 will report to the project supervisor. The Fish Biologist 3 will take on the project leadership for the WDFW's role in the Fish Facility operation and evaluation, Fish Collection, Passage and other related needs/issues with the Cowlitz Falls project.

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The Project Supervisor will take lead roles in the tasks associated with supervision, policy oversight, coordination, and TAC issues listed here. The Project Supervisor and Fish Biologist 3 will share work on Objectives 1 and 2. The Project Supervisor, Fish Biologist 3 and Fish Biologist 2 will share the work described in Objectives 3 to 5 as appropriate.

### *Program Objectives*

OBJECTIVE 1. Provide the overall coordination for the Cowlitz Falls Project restoration of anadromous fish and fish passage programs.

OBJECTIVE 2. Coordinate and conduct Support/Administrative contract management with BPA, WDFW, and TAC.

OBJECTIVE 3. Participate in Cowlitz Falls TAC and TAC subgroups as needed.

OBJECTIVE 4. Serve as liaison with Cowlitz Hatchery Complex to determine availability and priority of eggs/juveniles/adults for reintroduction.

OBJECTIVE 5. Develop and coordinate program for the transfer/release of adults and/or juveniles.

### FISH FACILITY/PASSAGE

#### *Approach*

The overall goal is to maximize the FGE while ensuring fish health throughout the collection, sampling, evaluation, transport, acclimation and release activities.

Fish Biologist 3 (expertise in the juvenile collection, sampling and transportation programs at the federal hydro projects on the Snake River):

- supervise activities at the Cowlitz Falls Juvenile Fish Collection Facility
- supervise, train and assist a Fish Biologist 2, up to four permanent and/or career seasonal technicians, and up to five temporary employees
- help plan and implement projects to evaluate fish collection efficiency (FCE) and fish guidance efficiency (FGE).
- plan, supervise and assist with the annual marking and tagging

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-coordinate development and implementation with Cowlitz Hatcheries staff and anadromous staff biologists

Fish Biologist 2:

- supervise the daily activities and ensure the proper handling and health of juvenile and adult fish
- ensure that all biological data are collected in the appropriate manner

*Program Objectives*

OBJECTIVE 1. Operate and evaluate the Cowlitz Falls fish collection facility for the collection and transportation of anadromous salmonid smolts, and presmolts. Collect anadromous smolts for transport to and release from the stress relief ponds at the Cowlitz Salmon Hatchery. Determine species composition, numbers collected, transported, and collect appropriate biological and mark data from a representative sample of fish at the facility.

TASK 1.1. Develop, refine and implement annual plan for facility operation and evaluation.

Sub Tasks:

- a) Refine operational protocols
- b) Determine most efficient operational procedures that minimize stress on fish (e.g. separator settings - wet or wetted, angles; valve settings; flume dewatering).
- c) Identify and implement any critical changes and/or modifications required

TASK 1.2. Provide biological oversight and work with BPA/LCPUD to identify and correct project deficiencies.

TASK 1.3. Develop and test alternative options and needs for fall/winter operation; i.e., limited sampling to establish baseline data on fish movement, and tests with and without baffle panels in place.

TASK 1.4. Operate the juvenile facility seven days per week during the spring-summer migration (April 1 through July and then, depending upon the numbers of fish collected, reduce sampling to an as needed basis. Establish threshold numbers for such changes in operation plans.

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TASK 1.5. Operate the juvenile facility during the fall emigration expected to begin in October and end in December. Daily operation would depend upon the numbers of fall migrants collected. We propose to operate the facility at least two days per week, as long as project operations permit. If and when catches become significant, we propose to operate the facility for up to seven days per week for up to five weeks.

TASK 1.6. Sample or subsample all fish collected until/unless numbers exceed staff and/or facility capacity to safely handle. Sample and record appropriate biological data, species, length, weight, mark data, scales, fish condition, descaling, injuries, degree of smoltification (visual, and/or some limited ATPase sampling). Incorporate tests (facility evaluation) for delayed mortality as a result of collection and handling prior to transport and prior to release from the stress relief ponds at Cowlitz Salmon Hatchery.

Sub Task:

- a) Plan and develop a small scale sampling program to examine ATPase levels throughout the spring-summer migration season to complement visual observations and relative abundance with an independent contractor (e.g., United States Geological Survey, Cook, WA)

TASK 1.7. It is expected that TPU will transport smolts from Cowlitz Falls to Stress Recovery/Release Ponds at Cowlitz Salmon Hatchery during the spring-summer and fall migration/collection periods. The following schedule is recommended:

April 1-15: every other day

April 16- August 15: daily, and

Oct.1 - Dec. 15: three days per week, Monday, Wednesday and Friday pending facility operation.

TASK 1.8. Monitor PIT tag detection system, record and summarize data records.

TASK 1.9. Collect and record pertinent facility operational data: e.g., flow through powerhouse, spill, percent of flow through screened/unscreened vertical slot baffles, water temperature.

TASK 1.10. Provide weekly updates during the spring-summer migration(April - mid August), biweekly updates during the fall migration period ( mid- August - November)

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and monthly updates form December to March. These updates will summarize facility operation, collection, sampling, transportation, and other project activities.

**OBJECTIVE 2. Evaluate fish collection and guidance efficiency (FGE) for the Cowlitz Falls Project.**

TASK 2.1. Develop and implement plans to evaluate fish collection and guidance efficiency and effectiveness of the collection system. Fish collection efficiency is simply the proportion of actively migrating smolt/pre-smolts collected at the facility, marked, released upstream and then recaptured in the collection facility. Fish guidance efficiency is the actual proportion of fish entering the collection facility versus passing the project via the turbine intake or induction slots for each gatewell. Review with Fish Passage Subgroup.

TASK 2.2. Collect and mark (pan jet marks, fin clips, elastomer marks) specific groups of spring chinook, coho, and steelhead for Fish Collection Efficiency evaluation throughout the season. Review and refine current methods for marking and releasing fish for FCE tests. Plan and test different release strategies to assess variability observed in FCE tests in '96 and '97, e.g.- handling/release protocols, multiple releases within one day, different release sites. Set up necessary equipment, mark and transfer test fish to selected acclimation/release sites, and release test fish. As an option we may set up the Merwin Trap to capture fish for FCE needs during the spring-summer migration.

TASK 2.3. Develop study plan in cooperation with Lewis County PUD/BPA Project Biologist and conduct tests to identify fish passage through the turbine via induction and/or turbine intake (most likely fyke nets and or gillnets). Continue to refine system to collect fish passing through fish flap gates for diel and behavioral information on fish collection.

**OBJECTIVE 3. Plan and develop long range marking program to evaluate reintroduction strategies and relative yield as smolts to the fish facility. Review plans with Fish Passage Subgroup. Coordinate and implement marking programs.**

The current long range plan envisions using thermal marking of otoliths to mark age 0 fry before release. We can mark all fry with a unique mark for less than \$0.02/ fish at present. We also propose to tag up to 1000 parr/pre-smolt steelhead, coho, and spring chinook with an Alpha Numeric or Visible Implant Elastomer tag in the field from late August through early October in selected tributaries. We have not included any plans for PIT tagging.

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**OBJECTIVE 4. Mark Spring Chinook and Cutthroat smolts for adult recovery.**

**OBJECTIVE 5. Prepare regular progress reports (See Task 1.10) and an annual report.**

**NATURAL PRODUCTION and INTERACTION:**

**Approach**

The limited natural production and interaction work is integrated into the Fish Passage/Fish Facility work plan and requires about 11 months of technician time and up to 2-3 months for the project biologists. Activities include:

- identifying release sites for juvenile and adult salmonids in the upper basin,
- coordinating the release of juvenile and/or adults in the upper basin
- assisting with these releases as needed
- assist and/or mark fish as needed
- monitor and measure relative abundance of juvenile salmonids in selected areas
- mark larger parr/pre-smolts with Alpha Numeric or Elastomer VI tags.

***Program Objectives:***

**OBJECTIVE 1. Review and/or refine techniques to evaluate current reintroduction strategies.** Zero age hatchery-origin coho, spring chinook and steelhead fry will be planted into the upper Cowlitz and Cispus watersheds to use available rearing area in both mainstem and tributary areas. Steelhead will be planted as fed fry in early fall. This current strategy may be adjusted as we learn what works best.

**OBJECTIVE 2. Conduct limited field surveys from mid summer to early fall to monitor and evaluate the distribution, migration and relative survival of planted hatchery spring chinook, coho, and steelhead juveniles.**

TASK 2.1. Conduct surveys to monitor the distribution, abundance, and presence or absence of planted and wild fish in selected release areas and/or index sites using electrofishing equipment, beach seine(s) and snorkel equipment. Measure fish abundance



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and distribution over time. The goal is to develop fish per unit of area values over time for these selected areas/sites.

TASK 2.2. All fry will be marked (otolith thermal mark) to allow us to monitor their movement, distribution and relative survival within the tributaries and mainstem Cowlitz and Cispus. These marks will also allow us to measure relative yield as smolts to the Fish Facility as well. During the field surveys we will attempt to identify selected areas where we can capture 1,000 parr/pre-smolts large enough to mark with the alpha numeric or elastomer VI tag to measure yield as smolts to the Fish Facility collection from these areas.

**OBJECTIVE 3. Conduct limited field surveys to monitor the distribution and spawning success of adult salmonids and their progeny.**

## **ARTIFICIAL PRODUCTION**

### ***Approach***

A Fish Biologist 4 will assist in and/or participate in consultations and conferences required of BPA in obtaining operating permits under Section 7 or 10 of the Endangered Species Act (ESA). This person is also responsible for overall coordination of activities within WDFW Hatcheries Program. In addition this person chairs the Artificial Production subgroup and is a key member of the TAC.

Annual staff requirements are: Fish Biologist 4 (4 months).

### ***Program Objectives:***

**OBJECTIVE 1 Provide WDFW hatchery expertise in Endangered Species Act Requirements**

**OBJECTIVE 2. Provide report of activities for inclusion in quarterly/annual reports to BPA.**

Tables 1-4 were provided in a progress report.

Table 1. Cowlitz Falls smolt production potential and WDFW enhancement program goals.

COWLITZ FALLS RESTORATION PROGRAM			
PLAN OBJECTIVES			
UPPER COWLITZ SMOLT POTENTIAL			
SPECIES	METHOD	STRATEGY	SMOLT POTENTIAL <sup>1</sup>
Spring Chinook	Outplanting and Natural Production	Outplant fry/fingerlings into upper watershed in initial years and ultimately replace with natural production as adults become available	311,000
Coho	Outplanting and Natural Production	Outplant fry/fingerlings into upper watershed in initial years and ultimately replace with natural production as adults become available	628,000
Steelhead	Outplanting and Natural Production	Outplant fry/fingerlings into upper watershed in initial years and ultimately replace with natural production as adults become available	100,000
Spring Chinook	WDFW Enhancement/ Adult Seeding	Rear to smolts in upper watershed (net pens, ponds, etc.) for imprinting and release below Cowlitz Barrier Dam. The adults which escape the fishery will be allowed to spawn naturally.	200,000
Steelhead	WDFW Enhancement/ Adult Seeding	Rear to smolts in upper watershed (net pens, ponds, etc.) for imprinting and release below Cowlitz Barrier Dam. The adults which escape the fishery will be allowed to spawn naturally.	75,000

<sup>1</sup>

Taken from table 2-3 of the Plan - Estimated smolt production potential...

Table 2. Estimated fry/fingerling release numbers needed to attain smolt production from

JUVENILE SALMONID RELEASE STRATEGY<sup>2</sup>

1997			
SPECIES	METHOD	STRATEGY	NUMBERS
Spring Chinook	Outplanting	Upper Cowlitz fry release in March and fry/fingerlings in April.	500,000 200,000
Coho	Outplanting	Upper Cowlitz fry release in March and fingerlings in June.	750,000 250,000
Steelhead	Outplanting	Upper Cowlitz fry release in September.	450,000
Steelhead	WDFW Enhancement/ Adult seeding	Hatchery reared to presmolt size and grown out to smolts in net pens in upper watershed. - Release below Barrier Dam. - Release into upper watershed.	50,000 45,000
Coho	FGE Evaluation	Released immediately above the collection facility for FGE tests.	5,000
Steelhead	FGE Evaluation	Released immediately above the collection facility for FGE tests.	5,000

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Fry release numbers to attain smolt numbers listed in Plan Objective.

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Table 3. Species collected at the Cowlitz Falls Project during two seasons of interim operation.

YEAR	STEELHEAD	COHO	CHINOOK	CUTTHROAT	TOTAL
1995	1,584	310	159	91	2,143
1996	5,907	5,957	78	210	12,152

Table 4. Estimated 1997 release numbers, survival to Project, FGE, catch numbers (numbers released to lower Cowlitz River).

JUVENILE SALMONID RELEASE STRATEGIES AND ESTIMATED LOWER RIVER RELEASE NUMBERS							
SPECIES	METHOD	REARING AND RELEASE STRATEGY	REARED ABOVE PROJECT	SMOLT SURVIVAL TO PROJECT	PROJECT~ FGE	1997 ~ CATCH	COMMENTS
Spring Chinook	Outplanting	Upper Cowlitz fry released in March and fry/fingerlings in May/June	500,000 200,000	0.05 0.10	<0.01	<250 <200	Expect majority to emigrate fall/winter
Coho	Outplanting	Upper Cowlitz fry release in March and fingerlings in June.	750,000 250,000	0.05 0.10	0.40	15,000 10,000	Expect majority to emigrate fall/winter
Steelhead	Outplanting	Upper Cowlitz fry release in September.	450,000	0.05	0.50	11,250	Holdover rate unknown <sub>A</sub>
Steelhead	WDFW Enhancement/ Adult seedings <sub>B</sub>	Hatchery reared to presmolt size and grown out to smolts in net pens in upper watershed. - Release below Barrier Dam. - Released into upper watershed.	50,000 45,000	N/A 0.90	N/A 0.50	50,000 20,250	--- Holdover rate unknown <sub>A</sub>
Coho	FGE Evaluation	Released immediately above the collection facility for FGE tests.	5,000	N/A	0.40	2,000	---
Steelhead	FGE Evaluation	Released immediately above the collection facility for FGE tests.	5,000	N/A	0.50	2,500	Holdover rate unknown <sub>A</sub>
TOTAL LOWER RIVER SMOLT RELEASE ESTIMATE						111,450	